

Appendix A. Overview of Common Sources of Data for Studying Nursing Home Safety

Nursing Home Self-reported Data

All nursing homes nationwide are required to report resident-specific data via the Minimum Data Set (MDS) on a quarterly basis. These MDS data are used to determine reimbursement rates and generate “quality indicators” separately for short and long-stay residents. Recently, the MDS was updated to version 3.0, which incorporates standardized resident interview questions for many aspects of a resident’s functioning (e.g., pain, depression, cognition, daily care preferences) to minimize subjective assessments by staff and, thus, improve the accuracy of these assessment data.¹ In addition to resident-level data, nursing homes are also required to report staffing levels (i.e., licensed nurses, nurse aides and overall), although it is important to note that staffing data are not reported separately for short and long-stay residents. In particular, facilities provide a detailed breakdown of staff hours on CMS Form 671, which is then incorporated into the CMS CASPER database. Facilities typically report staffing over a 14-day collection period prior to the survey inspection and report hours for a range of staff categories, including RN, LPN and nurse aides, RN directors of nursing, administrative RNs, licensed practical/vocational nurses, and medication aides/technicians.

Staffing levels and MDS-generated quality indicators are publicly reported, in conjunction with inspection results, at www.Medicare.gov/nursinghomecompare. Using an algorithm that combines data to create an aggregate quality rating, these data nursing home quality is ranked on a 5-star system, in which a higher number of stars is intended to be indicative of better quality. Importantly, concerns have been raised of inaccuracies in both the MDS-derived quality indicators and staffing data reported by facilities, with a potential for systematic bias in the direction of over-estimating care quality and overall staffing levels.²⁻⁵ In addition, CMS recently restructured the 5-star rating system to make it more difficult for facilities to achieve a high rating due to large increases over time in the number of homes achieving the highest quality ratings.⁶ Recent efforts have also included the use of external surveyors to audit the accuracy of both MDS and staffing data during site visits (e.g., directly checking payroll data to verify reported staffing levels). Despite concerns about inaccuracies and bias, these self-reported data are publicly available for all nursing homes nationwide and make up a large database that has been used in many studies of nursing home care quality and safety. Recent efforts have also attempted to expand nursing home self-reported data to include medication errors and other adverse events. However, the addition of these measures has not yet been widely implemented and similar concerns about accuracy would presumably remain.

Claims Data

Health care utilization data are tracked by CMS for all Medicare fee-for-service beneficiaries and can be used to identify potentially adverse events related to resident safety. Hospital admissions and readmissions and emergency room visits are two claims-based measures most frequently used to assess resident safety, including identifying specific diagnoses thought to reflect conditions that could have been better managed or prevented in the nursing home setting.⁷ Other studies have used claims data relevant to medications and other treatments to evaluate safety (e.g., effectiveness of pain management; use of anti-psychotics and risk for other adverse outcomes, such as falls). The two primary limitations of claims data are that they are not widely

available for Medicare HMO residents and they do not directly measure care processes related to safety outcomes.

Medical Record Review by External Evaluation Staff

Given the limitations of nursing home self-reported and CMS claims data, standardized methods to evaluate adverse events through medical record reviews by independent clinical evaluators (e.g., physicians, nurses) have been developed and applied in multiple studies.⁸ This medical record review methodology requires that trained staff external to the nursing home review resident records to identify potential safety issues (e.g., commonly described as “event triggers,” such as an episode of dehydration). Medical records are then reviewed in-depth using a standardized protocol to determine if there is documentation of key care processes that could have prevented the adverse event and the extent of harm (e.g., hospital admission). This methodology has been applied to both short and long-stay nursing home populations in studies reporting a significant rate of potentially “preventable” adverse events for both groups.^{8,9} This standardized medical record review approach results in a more accurate assessment of care processes related to the safety outcome relative to the use of nursing home self-reported data or claims data. However, it is labor-intensive and requires evaluators with a high degree of clinical training and skill, limiting the number of residents for whom these data can be collected.

Direct Observations of Care and Resident Interviews

Another approach is to use standardized protocols to directly observe or interview residents. Questions might include, for example, “How long do you have to wait for staff to answer your call light?”^{10,11} Multiple studies have demonstrated that a significant proportion of residents with mild to moderate cognitive impairment remain capable of accurately describing their care experience and preferences such that this method could be used for number of populations.¹¹⁻¹³ Similarly, standardized observational protocols have been developed with established reliability and validity, but such protocols are not consistently used in many studies to assess care practices.¹⁰ If trained staff external to the nursing home, such as researchers, conduct the observations and interviews using standardized protocols, data are typically accurate. As previously mentioned, direct observation of care has revealed that medical record documentation of care processes by nursing home staff is often inaccurate and reflects a consistent bias toward overestimating care frequency for multiple aspects of daily care including incontinence care, feeding assistance, supplement delivery, repositioning, and mobility assistance.¹⁴ However, these studies also have demonstrated that nursing homes with higher total staffing levels provide more consistent care relative to homes with lower staffing levels.¹⁵ Observational methodologies also have been applied to medication delivery in both the hospital and nursing home care settings to document medication errors, which have shown a higher rate of errors in the nursing home setting.^{16,17}

The methodology has similar advantages and disadvantages to the standardized medical record review approach. Specifically, it provides accurate, specific data about care processes related to safety, but it is labor-intensive and typically only includes a small subset of residents and/or facilities. New technologies are currently being developed to monitor staff and resident behavior (e.g., location and movement sensors), which may allow for these type of data to be collected more easily.

Survey Staff Inspections

All nursing homes are surveyed annually during onsite visits by multidisciplinary survey teams to assure compliance with federal standards that guide the Medicare & Medicaid programs. In 2015, nursing homes received an average of 6.1 deficiencies per facility during their annual survey (Table 2). Surveyors rate care deficiencies based on the scope (e.g., isolated event, pattern or widespread) and severity (e.g., potential for minimal harm, more than minimal harm, actual harm, and immediate jeopardy to resident health or safety). Only a small percentage of facilities nationwide (3.4 percent) had deficiencies rated as causing immediate jeopardy or actual harm (Table 2).

Survey teams are supposed to use a combination of medical record review, resident interview and observational methodologies to guide their evaluations. However, the survey process has been criticized for lacking standardization in the assessment methods, resulting in variability between survey teams related to the number and type of deficiencies issued for a particular nursing home. There have been recent efforts to improve the standardization of the survey process but variability remains a challenge.¹⁸ Survey deficiencies are publicly-available, and deficiencies have been shown to correlate with staffing levels but not consistently with the MDS-derived quality indicators.¹⁹

References

1. Centers for Medicare & Medicaid Services. Minimum Data Set, Version 3.0 (MDS 3.0). Washington, DC: Centers for Medicare and Medicaid Services; 2010.
https://www.cms.gov/NursingHomeQualityInits/45_NHQIMDS30TrainingMaterials.asp#TopOPage
2. Thomas K. Medicare star ratings allow nursing homes to game the system. New York Times. 2014 August 24, 2014.
3. Cadogan MP, Schnelle JF, Yamamoto-Mitani N, et al. A minimum data set prevalence of pain quality indicator: is it accurate and does it reflect differences in care processes? J Gerontol A Biol Sci Med Sci 2004 Mar;59(3):281-5. PMID: 15031314.
4. Simmons SF, Cadogan MP, Cabrera GR, et al. The minimum data set depression quality indicator: does it reflect differences in care processes? Gerontologist 2004 Aug;44(4):554-64. PMID: 15331813.
5. Schnelle JF, Cadogan MP, Yoshii J, et al. The minimum data set urinary incontinence quality indicators: do they reflect differences in care processes related to incontinence? Med Care 2003 Aug;41(8):909-22. PMID: 12886171.
6. Centers for Medicare & Medicaid Services. CMS Announces Two Medicare Quality Improvement Initiatives. October 6, 2014.
<https://www.cms.gov/Newsroom/MediaReleaseDatabase/Press-releases/2014-Press-releases-items/2014-10-06.html>.
7. Kramer A, Fish R, Min S. Community Discharge and Rehospitalization Outcome Measures (Fiscal Year 2011). MedPAC. Washington, DC: Providigm, LLC; 2013.
http://www.medpac.gov/documents/contractor-reports/apr13_communitydischarge_contractor.pdf.
8. Levinson D. Adverse Events in Skilled Nursing Facilities: National Incidence Among Medicare Beneficiaries. OEI-06-11-00370, February 2014. 2014.
<http://oig.hhs.gov/oei/reports/oei-06-11-00370.pdf>.

9. Handler SM, Wright RM, Ruby CM, et al. Epidemiology of medication-related adverse events in nursing homes. *Am J Geriatr Pharmacother* 2006 Sep;4(3):264-72. PMID: 17062328.
10. Simmons SF, Babineau S, Garcia E, et al. Quality assessment in nursing homes by systematic direct observation: feeding assistance. *J Gerontol A Biol Sci Med Sci* 2002 Oct;57(10):M665-71. PMID: 12242322.
11. Simmons SF, Schnelle JF. The identification of residents capable of accurately describing daily care: implications for evaluating nursing home care quality. *Gerontologist* 2001 Oct;41(5):605-11. PMID: 11574705.
12. Chu L, Schnelle JF, Cadogan MP, et al. Using the minimum data set to select nursing home residents for interview about pain. *J Am Geriatr Soc* 2004 Dec;52(12):2057-61. PMID: 15571542.
13. Simmons SF, Ouslander JG. Resident and family satisfaction with incontinence and mobility care: sensitivity to intervention effects? *Gerontologist* 2005 Jun;45(3):318-26. PMID: 15933272.
14. Schnelle JF, Bates-Jensen BM, Chu L, et al. Accuracy of nursing home medical record information about care-process delivery: implications for staff management and improvement. *J Am Geriatr Soc* 2004 Aug;52(8):1378-83. PMID: 15271130.
15. Schnelle JF, Simmons SF, Harrington C, et al. Relationship of nursing home staffing to quality of care. *Health Serv Res* 2004 Apr;39(2):225-50. PMID: 15032952.
16. Donaldson N, Aydin C, Fridman M, et al. Improving medication administration safety: using naive observation to assess practice and guide improvements in process and outcomes. *J Healthc Qual* 2014 Nov-Dec;36(6):58-68. PMID: 25385491.
17. Lane SJ, Troyer JL, Dienemann JA, et al. Effects of skilled nursing facility structure and process factors on medication errors during nursing home admission. *Health Care Manage Rev* 2014 Oct-Dec;39(4):340-51. PMID: 24153027.
18. US Government Accountability Office. Nursing Homes : Federal Monitoring Surveys Demonstrate Continued Understatement of Serious Care Problems and CMS Oversight Weakness. GAO-08-517, May 2008. 2008. <http://www.gao.gov/new.items/d08517.pdf>.
19. Centers for Medicare & Medicaid Services. Data.Medicare.gov. Baltimore, MD: Centers for Medicare & Medicaid Services. <https://data.medicare.gov/>.

Appendix B. Summary of Key Informant Calls

Technical Brief Key Informant Discussion Call #1 Vanderbilt Evidence-based Practice Center Technical Brief: Critical Analysis of the Evidence for Patient Safety Practices in Nursing Home Settings

Patient Safety Technical Brief Discussion

*Participant names have been redacted from these summaries

Introduction to Guiding Questions (GQs)

EPC began the discussion by introducing the first guiding question (GQ) and soliciting for general feedback from the key informants (KIs).

EPC mentioned that the GQs help guide the discussion and would like the KI's perspective on patient safety issues in the nursing home (NH) setting.

Definition of patient safety discussion

EPC inquired how broadly the patient safety construct should be defined. AHRQ defines patient safety broadly and asked the KIs to think about all the potential safety issues in NH settings across the CMS derived quality indicators: staffing, care omission, elder abuse and neglect. She solicited insight from the KIs on what the most silent issues are for NH patient safety.

KI responded that some view patient safety very narrowly and need actual, measurable harm demonstrated rather than missed opportunities and wanted to be really careful about how patient safety is defined in the NH setting and **KI** agreed.

Quality of life (QOL) and person centered care discussion

KI advised the group to not let patient safety issues overwhelm quality of life (QOL) issues and would like to see important QOL issues included under the patient safety definition.

EPC inquired if the KIs are speaking to issues like omitted care or missed care that may not result in an adverse event, but effects QOL, dignity, etc. and **KIs** agreed that this is extremely important.

KI stated that there are some person-centered measures that capture QOL. Edvardsson, from Norway has done work on developing patient-centered measures, looking at the tradeoff between patient-centered care and safety or adverse events.

EPC mentioned that Rosalie Kane has also written about person-centered care.

EPC stated that one part of the technical brief is to summarize the gaps and point out areas for future research. There is a paucity of quality of life interventions, or person centered interventions so this would be a gap in the literature to highlight for future research.

KI added that NH resident's subjective experience should be counted here. Research in the NH setting needs to accommodate the experience of the residents in long-term care settings rather than defining quality of life formulaically and the **EPC Team** agreed.

Staff educational training/changing staff behavior discussion

KI added educational programs in long-term care settings as a potential patient safety issue and noted that there is intervention research on educational programs and sustainability of those programs over time and will email some references to the team.

EPC inquired if **KI** meant there needs to be a different approach to staff training and education that is much more evidence-based in the education or training literature and she agreed.

EPC asked the KIs what they see as some of the significant challenges in changing staff behavior?

KI noted that NH leadership (e.g., director of nursing) is generally inadequately trained in management and is a common problem across NHs. She also noted that nurses who work in NH units also lack management skills (e.g., managing the unit or managing people). There's a paucity of staff education in managing people.

KIs also noted that frontline staff are generally poorly trained, poorly resourced, and left out of decision making. Another key issue is the trend to hire more LPNs, fewer RNS and even fewer BSNs. If you look at the hospital literature, it suggests that there is a direct correlation to increased mortality, morbidity and costs. LPNs are not trained to assess and, by law in most states, shouldn't be assessing.

KIs also pointed out that the real patient safety issues are with staff skill mix (e.g., staff skills matched with the skills that are needed in different NH settings with different resident mixes).

KI stated that Nurse Aides have very little training (state's minimum number of hours, annual infection control, fire safety, compliance training).

Overall staff mix/skill levels

KI acknowledged that NH upper level management doesn't differentiate between CNAs and RNs due to the lack of understanding of differences in skill training and scope of practice between the CNAs and RNs or BSNs.

EPC agreed and added that the scope of practice in NHs is changing. More and more tasks that used to be done by licensed nurses that are now done by nurse aides.

KI would like to see an intervention looking at staff mix in the NH setting. Linda Atkins conducted a staff mix study in hospital settings and those credentials (RN vs. LPN/CAN) actually made a big difference in patient outcomes.

Staff turnover/staff to resident ratio issues

KI brought up the issue of inadequate onboarding of staff with minimal orientation.

KI suggested that one possible outcome measure would be employee turnover.

EPC noted that patient to nurse aide ratio is between 10-15 residents to 1 nurse aid and suggested that increasing staffing numbers, education, training, and management of residents are key issues and the **KIs** agreed.

Systems level issues

KI suggested adding systems level issues as a patient safety issue.

EPC Team agreed that when identifying intervention studies in this care setting they are often focused on an isolated aspect of care with one or two key outcomes and that a multifaceted, systems-level intervention is warranted.

EPC agreed that a multicomponent intervention would need to go into a NH and change everything at the same time and implement it.

KI reiterated the key issues are organizational change, including resident case mix changes and staff training.

KI mentioned that the Robert Johnson Foundation funded 5 research groups to conduct a series of nested studies on the Greenhouse program that asked similar questions from different vantage points including large data sets, interviews, MDS and field work. She noted that an article was published in HSR last year on the mixed methods process and challenges, and a special issue that the WJ purchased in Health Services Research that is coming out in early 2016.

White House Conference on Aging Brief

The EPC Team inquired if the **KIs** were familiar with the White House Conference on Aging brief about the changes to improve care and safety in NHs by HHS secretary Sylvia Burwell,

specifically the change to ensure that NHs take into consideration the health of residents when making decisions on the kinds of levels of staffing.

KIs mentioned that the federal register report on staffing in NHs actually alluded to that as well.

Patient Safety as a broader issue

EPC inquired if the existing measures (e.g., falls, pressures ulcers, weight loss) are not adequate measures of quality or safety in the NH.

KI agreed that the existing patient safety measures should take into consideration quality of life issues (e.g., restraining a resident so that he doesn't fall and limiting his quality of life/dignity versus letting the resident have the freedom to move around and potentially fall but have quality of life).

Hospital care of elderly

KI stated that elderly patient safety is worse in the hospital (e.g., delirium, falls, pressure ulcers), due to hospital staff treating the condition without regard to the age of the patient.

EPC agreed that the hospital treat patients based on the diagnostic codes.

KI added that nurses and physicians tend to see the patient when they're first admitted as their baseline status instead of how they were functioning two weeks prior to the admission. She also added that most of the infections come from hospitals which are a very different situation than in a nursing home. There's an infectious disease specialist who is looking at how to keep other residents safe while not completely isolating a resident.

Admissions/Transfers to NHs

KI suggested that we look at admissions. Admissions to nursing homes are a huge issue. The transfer of care to NH setting is typically lacking in the information you get, who gets it, how that leads to a care plan, and if there was family involvement in the care planning process.

Resident mix changing over time (patient acuity level is higher)

KIs brought up the issue of changing resident mix and the increasing proportion of short and long stay residents. One of the challenges NHs face is how to effectively implement interventions and proper staff training/levels if you have a resident mix with different care needs. The issue of changing resident mix extends to new types of resident populations (e.g., ex-prisoners and parolees, psych patients, AIDS and HIV patients, more trauma patients) leading to higher levels of patient acuity.

The EPC Team agreed and added that this issue underscores the need for higher skilled workforce in NHs and the need for higher staff to resident ratios.

KI added that even among short stay residents, the nature of the population is changing. Residents with hip or knees conditions are being replaced by more medically complex care residents even in the short stay NH settings.

Technical Brief Key Informant Discussion Call #2

Vanderbilt Evidence-based Practice Center Technical Brief: Critical Analysis of the Evidence for Patient Safety Practices in Nursing Home Settings

Patient Safety Technical Brief Discussion

Introduction to Guiding Questions (GQs)

EPC introduced the GQs to the Key Informants (KIs) and solicited their input based on their experiences and perspectives in the field.

Scope/definitions of GQs

KI pointed out that the term *patient* should be replaced with *resident* since that is the accepted term in the nursing home (NH) and assisted living communities. She also brought to the team's attention that the GQs were medically oriented in scope rather than including person-centered quality of life issues.

KI also inquired about dementia in the GQs and stated that roughly half of NH residents have some form of cognitive impairment, many of them with dementia and the comparative figure in assisted living is 40%. She also added that we should be inclusive of the broader category of *cognitive impairment*, not solely *dementia* residents in NHs and assisted living facilities.

EPC solicited input from the KIs on how to handle the definition of patient safety for issues that are not measured by adverse events (e.g., quality of life issues for dementia care).

KI inquired if the EPC team was aware of the dementia report that the National Quality Forum did recently? The report provides a conceptual framework for measurements and a literature review on quality measures and the measures that they went through cover the assisted living and NH environments.

Gaps in the literature discussion

EPC asked the KIs for input on other salient issues, gaps in the literature or issues for future research that are important to capture in this report.

The KIs suggested that outcomes related to dementia: falls, wandering, use of antipsychotics, and inappropriate medication use that affect cognition should be included.

Patient Safety issues in Assisted Living facilities discussion

The EPC team inquired if safety problems for dementia residents are worse in assisted living than they are in NHs.

KI was unsure, but reiterated that NHs are far more sophisticated in tracking patient safety issues (e.g., falls) than assisted living facilities.

KI added that mild cognitive impairment is not the same as early stage dementia and there are many different types of dementia, many of which are diagnosed in error.

EPC agreed that assisted living facilities have a lot of cognitively impaired people and creates additional safety issues.

EPC inquired if there were other safety concerns dementia residents in either assisted living or nursing homes that the EPC team needed to include in the report

KI added swallowing disorders as a significant patient safety issue for Parkinson's and dementia residents.

Dementia

EPC inquired if the issue of medically focused definitions of safety from AHRQ needs to be expanded to include quality of life issues.

KI agreed that resident safety isn't about medical approaches all of the time. For example, a person with dementia who wanders (as many as 60-80 percent of people with dementia will wander) isn't particularly a medical issue, but it's a safety issue. Protocols need to be implemented to address unaccompanied wandering off property or into other resident's room. **EPC** suggested starting the discussion in the area of safety issues for dementia care that are medically related or a central concern for that group of residents in both NHs and assisted living settings.

Delirium

KI added delirium as an important patient safety issue. Delirium, knowing whether or not someone has delirium is important. Pain is another clinical measure that is important with delirium residents and their ability to communicate their condition

The EPC team agreed and noted that there's literature that has repeatedly demonstrated that those with dementia or any type of cognitive impairment are at much higher risk and have poorer clinical outcomes. Accurate treatment of pain, depression, delirium, medication appropriateness, or medication errors should all be considered patient safety issues for the cognitively impaired population and they are going to be at higher risk.

Medication errors

EPC inquired if medication error is significant safety concern for assisted living facilities since there is such a low level of licensed nurses.

KI agreed and stated that most of the assisted living facilities used medication aids (not CNAs). Her facilities use LBNs and LPNs, but even then LPNs and LBNs have minimal training. Safety is really a huge issue and it's getting kind of alarming because the acuity levels are just so high.

Regulating assisted living facilities

KI noted that more states including California are looking into regulating assisted living facilities. The Assisted Living Association is trying to be proactive and develop regulations. The CALA association (California Assisted Living Association) has been collecting data precisely to track some of these safety issues. Other organizations are TALA (Texas Assisted Living Association) and the Alpha Group.

Grey literature resources discussion

EPC asked the KIs where they look to find interventions to implement on site.

KI mentioned that The Alzheimer's Association has a series of dementia care practice recommendations that have been around since the 2000's in the grey literature that you wouldn't necessarily find in a PubMed search. Dementia care practice recommendations provide an outline on how people can best take care of people with dementia, but how does the facility take that and translate it into an educational program for their staff and how did they implement it during the care planning process? That is where I think the most work probably needs to be done at least in the area of dementia.

KI agreed and suggested looking at the assisted living trade associations (annual meeting, educational conferences). Look at the list of lectures and seminars and sessions they have devoted to safety issues as an indicator of what the trade itself is identifying as problems. And you'd also identify through those trade associations identify their own experts.

Change in resident mix for assisted living facilities discussion

The KIs brought up the resident mix is changing for assisted living facilities. NHs used to have residents with more complex medical needs, but now assisted living facilities are seeing an increase in this type of resident and the assisted living industry is aware it is happening, but just beginning to try to set up some regulations to help better deal with this type of complex resident.

Staffing mix/ratio/skill level in assisted living facilities and NHs discussion

KI stated that her expertise is mostly with assisted living and the quality of the staff skills is an issue. One of the problems is that assisted living facilities are taking on higher and higher acuity residents that used to be handled in NHs almost exclusively. The assisted living facilities are not staffed with the skill level of a NH or a hospital. The highest skilled staff is the director who might be an RN. Staff mix is mostly LPNs with no skill/competence in assessment, CNAs or aides. Outcomes- in assisted living the outcomes are not tracked- there's no effort in assisted living to track these outcome measures as a way to improve quality. Assisted living is very primitive when compared to a NH setting.

The KIs added that there is staffing difference between the NHs and assisted living facilities in terms of skill level (e.g., less RNS, aids). Care providers in assisted living don't have to be certified nursing assistants and it's unclear how they are trained.

EPC also added that in nursing homes there are some regulations and consensus about what staffing levels should be, but there are little to no regulations in assisted living leading to a lot of assisted living facilities with very poor staff to resident ratios/mix.

KI agreed and noted that the staff ratio varies by state (e.g., the state of California requires assisted living facilities to have one staff for 15 residents) and not all states regulate this.

KI pointed out that assisted living was supposed to be more of a hospitality model for residents to have a gracious life with a little bit of assisted care.

EPC reiterated that in terms of interventions to improve patient safety, everything comes back to staffing (training, staff mix/ratio) and the **KIs** agreed.

KI added emphasis to the staff skill level and the staffing ratios are just not adequate for the levels of acuity in the NH or assisted living.

Person-centered care in assisted living facilities

KI stated that assisted living facilities tend to handle person centered care/dignity/quality of life issues better than NHs because assisted living started out as a hospitality model. Assisted living is an adjunct to independent living and that person-centered model of care has always been imbedded in the programs. The NH model is a nurse dominated model whereas assisted living really isn't

EPC inquired about the issues that might impede resident safety, including resident assessment and clinical information.

KI responded that assisted living has care plans required in most states, but care plans are loosely put together and not at the level of sophistication found in NHs where monitoring and tracking takes place. The issue with NHs is that they are over regimented (over structured).

KI reiterated that person-centered care is critical to the success of providing good quality of life for residents without or without dementia in assisted living (e.g., if someone likes to sleep late they are able to wake up at 10 in the morning instead of 6 in the morning when the shift changes). Knowing the person's background can help improve their quality of life and quality of care for other residents.

End of life care/Hospice

EPC also inquired about quality of end of life care at assisted living facilities and do you view that as a safety issue?

KI stated that the majority of assisted living facilities partner with hospice services. Hospice has its own model, its own rules and expectations

EPC inquired as to when the hospice service is initiated for a resident.

KI stated that the person is typically in a state of decline and will have physician involvement to place the order for hospice services. The family is also involved at this point. Hospice has social workers and grief counselors, and other services for the family. The safety issue would be the

staff not having adequate skills. Moving forward, all of our aids need to be CNAs, which would be a new staffing model for assisted living.

Technical Brief Key Informant Discussion Call #3

Vanderbilt Evidence-based Practice Center Technical Brief: Critical Analysis of the Evidence for Patient Safety Practices in Nursing Home Settings

Patient safety definition and overview of Guiding Questions (GQs)

The EPC team started out the discussion by introducing the Agency for Healthcare Research and Quality's (AHRQ) broad definition of patient safety soliciting feedback from the KIs on their views of patient safety in the context of nursing home (NH) settings.

KI stated that it would be challenging to cover every potential patient safety issue in one technical brief.

KI added that *safety* is not a *thing*, but a *result* and it would be hard to imagine safety as a *structure*.

The EPC team inquired if limiting the report to *adverse events* is the right course of action. Adverse events discussed in the literature include patient safety issues like falls, pressure sores, weight loss, and medication errors.

EPC reiterated that this report is looking at adverse events as outcomes.

KI added that from a hospital perspective, dealing with infections and reporting infection outcomes (e.g., surgical site infections), that we really don't know preventability. We know what our rate should be compared to our peer hospitals and can examine process failures and adherence, but we may not know direct causality or preventability. Several patient safety issues of concern in a post-acute care facility (e.g., NH, skilled nursing facility [SNF], assisted living) would be the acquired urinary tract infection (UTI), respiratory tract infection, and gastroenteritis, level of vaccinated workers, hand washing practices, and safe injection practice. Some of these are measurable (e.g., process, outcome measures).

EPC also inquired if preventability can be done in a nursing home not just in a hospital setting and **KI** stated that there's pretty good evidence in hospitals that depending on the kind of anesthesia used during an operation it reduces or increases the likelihood that specific types of patients have delirium post-surgically. Now what are the causes of delirium and do they arise while people are in nursing homes and can they be addressed and prevented? It's likely that it's possible to the extent that it's actually defined and documented.

EPC inquired if hospitalizations and burdensome transitional care should be encompassed under patient safety?

KI replied that there are a certain strata of patients with re-hospitalizations for hip fracture rehab which is a very different issue than re-hospitalizations of a NH resident with multiple chronic comorbidities and multiple medications. Those patients present a different set of clinical problems and a different set of clinical rates. Both can potentially be prevented and it depends of how you want to do that.

Scope of patient safety Issues covered in the report

KI stated that patient quality is a big issue and is subset of patient safety and need to define it in advance and focus on some of the most important patient safety areas because you can't cover everything and the **EPC team** agreed. She also pointed out that the literature on even one of these patient safety issues could be a whole technical brief in itself.

EPC inquired what salient issues are the most important to focus on in this report and **KI** stated that pressure ulcers, infection, psychotropic drug use, weight loss, activities of daily living (ADL) decline, incontinence, and pain are the main patient safety issues. Re-hospitalization could be included, but really should be in a separate report and the other **KIs** agreed.

EPC stated that some of the issues that have come up in our previous KI calls were aspects of safety and quality that have not been traditionally captured by the Nursing Home compare quality measures. She inquired if there other measures that are not necessarily clinical outcomes, but other types of outcomes that we should include in this report?

KI suggested adding the issue of staffing (e.g., low staffing levels lead to bad safety practice) and the **EPC team** noted that this is an issue that is cross-cutting over all patient safety issues. **The EPC team** inquired if it is important to include quality of life or resident-centered care issues in the report (e.g., non-clinical events, hospital readmissions).

KI suggested to not include quality of life under the concept of patient safety to help narrow the scope of how we are defining patient safety and the other **KIs** agreed that it would broaden the scope too far for this report.

KI also suggested limiting the report by not taking on assisted living and just point out the issues around assisted living and **KI** agreed that the report needs to focus on the medical safety issues where there's some institutional and societal obligation to keep people safe and the **EPC team** agreed.

Antimicrobial stewardship and infection control

KI noted that particularly in long-term care facilities, there is a need for antimicrobial stewardship for all uses of drug resistant organism infections (e.g., C. Diff.) and **KI** agreed that antimicrobial stewardship is a significant patient safety issue. The complications associated with antibiotic use in the face of infection whether they're asymptomatic or even marginally symptomatic implies for the overall burden in the facility and its risk of increase in population rates of multi-organ resistant bacteria. There is reasonably good evidence to suggest that some hospitals and NHs, as they transfer patients back and forth, became pretty significant reservoirs of drug resistant organism infections that have the adverse effect on everyone else that passes through those hospitals and NHs in terms of their increased risk of a drug resistant organism diagnosis subsequently and the role of antibiotic use on the context of that is a significant issue. They might be viewed as medication errors but they are actually not a classic medication error.

EPC inquired if hospitals are better at infection control and prevention than NHs and **KI** responded that hospital programs exist around the appropriateness of antimicrobials, in terms of indication (e.g., ensuring narrow spectrum antibiotics or treating colonization and appropriate diagnostic testing upfront) so there is not unnecessary use of antibiotics. The science is just starting as far as what interventions work, what is effective and that's just in acute care settings.

Short and long stay resident safety issues

KI inquired about patient safety issues in short and long stay NH populations. He noted that there is rising pressure surrounding preferred provider selection due to penalties from Medicare Advantage and the insurer's role in the contracting process. The differentiation between short and long stay is probably going to only be further differentiated in time and the safety issues for e.g., Alzheimer's care unit in assisted living. There are increasingly more post-acute settings that are more like extensions of hospitals and there is an expectation that those people going to post-acute are intending to go home. The long stay patients, they live there. It does become a

quality of life issue in terms of whether they have more autonomy and control and are willing to take the risk of some adverse events. It will never be 100% clear but to the extent that quality or safety, it is multifactorial and those factors are not correlated. It's even more so as you looked at that across short stay and long stay populations.

EPC reiterated that he was referring to as quality of life for long-term stay residents that the patient safety issues might not be accurately measure quality and the **KIs** agreed.

Increasing number of impaired assisted living residents

EPC stated that assisted living is seeing an increase in more impaired residents, but the staff skill level and staff ratios in assisted living facilities are lower than NHs. He inquired if that poses bigger safety issues/problems in assisted living than in NHs?

KI agreed and stated that the general trend has been that people in assisted living are more impaired than they were 10 years ago and people who are in assisted living now are people who were in NHs 10 or 15 years ago.

The KIs also noted that outcomes aren't tracked in assisted living facilities like they are in NHs and added that the median tenure in assisted living is only like 9-12 months before either dying or graduating to the NH.

Palliative Care and Hospice

KI noted another issue for both short term and long term care is the issue of residents in the facility for palliative care or hospice. When do you stop aggressive treatment and preventing infections during end of life care and questioned if the EPC team thought that would be considered a safety issue.

EPC agreed that this could be a safety issue for end of life residents that may get excessive treatment that could lead to adverse events and **KI** added that people who come directly from hospital units to hospice units (in NHs and SNFs) across the country is a very high and fast growing number and that it's an issue. He also added that Medicare Advantage (MA) patients typically enter hospice services about 5 days earlier than other patients.

Polypharmacy and medication reconciliation issues

KI brought up polypharmacy as a patient safety issue and stated that, for example, SNF patients take 15 medications on average. He also noted that some NH residents are treated for multiple comorbid conditions that require 3-4 medications per each condition resulting in high medication counts.

EPC agreed and noted that there are long-term residents taking medications for indications that no longer exist because due to lack of medication reconciliation would be considered a patient safety issue.

Staffing

KI brought up the issue of regarding quality improvement programs and intervention studies on staffing that are conducted in facilities that don't have adequate staffing so you don't see the results and suggested that a clinical trial on RN staffing was needed to demonstrate that almost all these patient safety outcomes might be better if you had RN staffing and **EPC** agreed that there are muted effects on any intervention because of staffing limitations.

KI suggested looking at staffing in the context of these outcomes and **EPC** agreed and mentioned that the issue of staffing, both in terms of number and kind of skill set, has come up several times as like an overarching issue that impacts all patient safety issues.

KI agreed and stated that the majority of staffing studies in hospital settings show that higher RN staffing makes a bigger difference in patient safety than higher total staffing.

Future Research Needs

EPC inquired if the KIs had any topics for potential future research in the NH setting.

KI suggested three future research topics:

1. What's the benefit of an extra hour of therapy?
2. Antibiotic stewardship affects both the short stay and the long stay in terms of the proclivity of a facility to actually engage in antimicrobial prescription and there is little evidence in the NH setting about how that's used what the positive effects of reducing or more rationalizing the use of antimicrobials might be.
3. What's the effect of more rationalized medication prescription and de-prescribing medications in very elderly or very frail NH residents?

Gray Literature

KI suggested that there's one area of evidence to look at which is the Quality Improvement Organizations (QIO) initiative about quality improvement which often does not lead to publications, but sometimes leads to reports and the **EPC team** agreed that this would be a good source for gray literature. **KI** also suggested reaching out to individuals in Denver who run the CMS QIO program across nursing homes.

Appendix C. Literature Search Strategies

Table B-1. PubMed Literature Search strings for nursing home patient safety categories

Falls		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,850
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,683
#3	#1 OR #2	57,529
#4	"Accidental Falls"[Mesh]	16,283
#5	"fall prevention"[tiab] OR "preventing falls"[tiab] NOT medline[sb]	313
#6	#4 OR #5	16,596
#7	#3 AND #6	858
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,376
#9	#7 AND #8	148
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	106
Moderate to Severe Pain		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,850
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,683
#3	#1 OR #2	57,529
#4	"Pain"[mesh]*	316,961
#5	"pain"[tiab] NOT medline[sb]	52,331
#6	#4 OR #5	369,158
#7	#3 AND #6	994
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,376
#9	#7 AND #8	145
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	87
Pressure Ulcer		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,850
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,683
#3	#1 OR #2	57,529
#4	"Pressure Ulcer"[Mesh]	9,954
#5	"pressure ulcer"[tiab] OR "decubitus ulcer"[tiab] OR "bedsore"[tiab] OR "pressure sore"[tiab] NOT medline[sb]	442
#6	#4 OR #5	10,394
#7	#3 AND #6	764
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,376
#9	#7 AND #8	92
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	69

Influenza Vaccine		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Influenza Vaccines"[Mesh]	17,027
#5	((("influenza"[tiab] OR "flu"[tiab]) AND ("vaccine"[tiab] OR "vaccination"[tiab] OR "immuniz*"[tiab]) NOT medline[sb])	1,856
#6	#4 OR #5	18,882
#7	#3 AND #6	315
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab])))	879,613
#9	#7 AND #8	50
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	30
Pneumococcal Vaccine		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Pneumococcal Vaccines"[Mesh]	5,072
#5	((("pneumonia"[tiab] OR "pneumococcal"[tiab] OR "antipneumococcal"[tiab]) AND ("vaccine"[tiab] OR "vaccination"[tiab] OR "immuniz*"[tiab]) NOT medline[sb])	825
#6	#4 OR #5	5,897
#7	#3 AND #6	56
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab])))	879,613
#9	#7 AND #8	9
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	6
Urinary Tract Infection		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	("Catheter-Related Infections"[Mesh] AND urin*) OR "urinary tract infections"[mesh:NoExp]	32,703
#5	"catheter-associated urinary tract infection"[tiab] OR "CAUTI"[tiab] OR "UTI"[tiab] OR "urinary tract infection"[tiab] NOT medline[sb]	1,870
#6	#4 OR #5	34,573
#7	#3 AND #6	359
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab])))	879,613
#9	#7 AND #8	41
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	26
Fecal/Urinary Incontinence		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870

#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Fecal Incontinence"[Mesh] OR "Incontinence Pads"[Mesh] OR "Urinary Incontinence"[Mesh]	33,070
#5	"Incontinence"[tiab] OR "incontinent"[tiab] NOT medline[sb]	3,268
#6	#4 OR #5	36,337
#7	#3 AND #6	723
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	101
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	61
Catheter Inserted and Left in Bladder		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Urinary Catheters"[Mesh] OR "Catheters, Indwelling"[Mesh] OR "Catheter-Related Infections"[Mesh]	18,181
#5	"catheter-associated urinary tract infection"[tiab] OR "CAUTI"[tiab] OR "UTI"[tiab] OR "urinary tract infection"[tiab] NOT medline[sb]	1,870
#6	#4 OR #5	20,051
#7	#3 AND #6	242
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	16
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	8
Physical Restraints		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Restraint, Physical"[Mesh:NoExp]	10,283
#5	"restrain*"[tiab] NOT medline[sb]	332
#6	#4 OR #5	10,615
#7	#3 AND #6	472
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	49
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	33
Need for Help with Activities of Daily Living		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536

#4	"Activities of Daily Living"[Mesh]	52,988
#5	"ADL"[tiab] "mobility"[tiab] OR "independence"[tiab] NOT medline[sb]	3,470
#6	#4 OR #5	56,458
#7	#3 AND #6	3,502
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR (("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab])))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	359
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	228
Lose Too Much Weight		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,882
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,703
#3	#1 OR #2	57,581
#4	"Body Weight"[Mesh] OR "Body Mass Index"[Mesh] OR "Nutritional Status"[Mesh] OR "Nutrition Therapy"[Mesh] OR "Eating"[Mesh] OR "Meals"[Mesh] OR "Nutrition Disorders"[Mesh]	618,102
#5	((("unintentional weight loss"[tiab] OR "liberalized diet"[tiab] OR "nutrition"[tiab] OR "food"[tiab] OR "bmi"[tiab] OR "body mass index"[tiab] OR "weight"[tiab] OR "malnutrition"[tiab] OR "dehydration"[tiab] OR "caloric"[tiab] OR "calories"[tiab] OR "meal"[tiab] OR "feed"[tiab] OR "supplement"[tiab] OR "diet"[tiab]) NOT medline[sb])	142,765
#6	#4 OR #5	760,449
#7	#3 AND #6	2,358
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR (("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab])))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	880,016
#9	#7 AND #8	299
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	214
Depressive Symptoms		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Depression"[Mesh]*	79,961
#5	"Depression"[tiab] OR "Depressive mood"[tiab]	235,418
#6	#4 OR #5	264,886
#7	#3 AND #6	2,021
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR (("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab])))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	427
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	287
Received An Antipsychotic Medication		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Antipsychotic Agents"[Mesh]*	42,743

#5	(antipsychotic[tiab] AND medicat*[tiab])	7,461
#6	#4 OR #5	45,331
#7	#3 AND #6	874
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	142
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	98
Medication error		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Medication Errors"[Mesh]	11,859
#5	"medication reconciliation"[tiab] OR "medication error"[tiab] NOT medline[sb]	279
#6	#4 OR #5	12,138
#7	#3 AND #6	302
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	44
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	41
Infection		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Infectious Disease Transmission, Professional-to-Patient"[Mesh]	1,555
#5	"healthcare associated infection"[tiab] OR HAI[tiab] NOT medline[sb]	327
#6	#4 OR #5	1,882
#7	#3 AND #6	37
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	7
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	6
Quality Improvement (system level), including transition and workforce training		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	54,870
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,670
#3	#1 OR #2	57,536
#4	"Quality Improvement"[Mesh] OR "Quality Indicators, Health Care"[Mesh] OR "Standard of Care"[Mesh]	21,433
#5	"workforce training"[tiab] OR "public reporting"[tiab] OR "patient hand-off"[tiab] OR "quality improvement"[tiab] OR "reducing error"[tiab] NOT medline[sb]	2,721
#6	#4 OR #5	24,154
#7	#3 AND #6	790

#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	879,613
#9	#7 AND #8	71
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	64
Medication polypharmacy/inappropriate prescribing		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	55,088
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,901
#3	#1 OR #2	57,985
#4	("Inappropriate Prescribing"[Mesh] OR "Polypharmacy"[Mesh] OR "Prescription Drugs"[Mesh] OR "Prescriptions"[Mesh] OR "Drug Utilization"[Mesh])	47,840
#5	Polypharmacy[tiab] OR "over-prescribe"[tiab] OR "over prescribe"[tiab] OR "overmedicate"[tiab] OR "over medicated"[tiab] OR "overmedicated"[tiab] OR "overprescribe"[tiab] OR "medication appropriateness"[tiab] OR "multi-drug"[tiab] OR "inappropriate drug"[tiab] OR "inappropriate medication"[tiab] OR "inappropriate prescription"[tiab] OR "drug overuse"[tiab] OR "zhan criteria"[tiab] OR "beers criteria"[tiab] NOT medline[sb]	1,148
#6	#4 OR #5	48,988
#7	#3 AND #6	1,322
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	891,435
#9	#7 AND #8	147
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	109
Resident Centered Care		Results
#1	"Nursing Homes"[Mesh] OR "Long-Term Care"[Mesh] OR "Homes for the Aged"[Mesh]	55,089
#2	"nursing home"[tiab] OR "long-term care"[tiab] OR "residential aged care"[tiab] OR "skilled nursing facility"[tiab] OR "aged care facility"[tiab] OR "aged care facilities"[tiab] NOT medline[sb]	2,902
#3	#1 OR #2	57,987
#4	"patient-centered care"[Mesh] OR "Green House"[tiab] OR "Eden Alternative"[tiab] OR "Wellspring Innovative Solutions"[tiab] OR "Planetree"[tiab]	12432
#5	"Culture change"[tiab] OR "individualized care"[tiab] OR "resident centered"[tiab] OR "person-directed"[tiab] OR "resident-directed"[tiab] OR "Person-centered"[tiab] OR "Resident-centered"[tiab] OR "Person-centered"[tiab] NOT medline[sb]	530
#6	#4 OR #5	12,962
#7	#3 AND #6	470
#8	(((((("Controlled Clinical Trial" [Publication Type]) OR "Multicenter Study" [Publication Type]) OR "Randomized Controlled Trial" [Publication Type])) OR (((("randomized"[tiab] OR "cluster-randomized"[tiab] OR "RCT"[tiab]) OR ((("trial"[tiab]) AND ("controlled"[tiab] OR "clinical"[tiab]))) OR ("systematic review"[tiab] OR "systematic literature review" [tiab]))))	891,706
#9	#7 AND #8	46
#10	#9 AND ("2005/01/01"[Date - Publication] : "3000"[Date - Publication])	40

Note: Searches conducted in June 2015

Table B-2. CINAHL Literature Search strings for nursing home patient safety categories

1	"nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities"	(33,522)
2	"randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness"	(147,681)

3	#1 AND #2	(1,358)
4	#2 Limited to - Published Date: 2005-2015; Exclude MEDLINE records	(216)
8	("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("Accidental Falls" OR "fall prevention" OR "preventing falls") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") Limiters - Published Date: 2005-2015; Exclude MEDLINE records	(10)
9	("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND "pain" AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") Limiters - Published Date: 2005-2015; Exclude MEDLINE records	(12)
10	("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("pressure ulcer" OR "decubitus ulcer" OR "bedsore" OR "pressure sore") Limiters - Published Date: 2005-2015; Exclude MEDLINE records	(15)
11	("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Influenza Vaccine" OR ("influenza" OR "flu") AND ("vaccine" OR "vaccination" OR "immuniz*")) Limiters - Published Date: 2005-2015; Exclude MEDLINE records	(2)
12	("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Pneumococcal Vaccine" OR ("pneumonia" OR "pneumococcal" OR "antipneumococcal") AND ("vaccine" OR "vaccination" OR "immuniz*")) Limiters - Published Date: 2005-2015; Exclude MEDLINE records	(1)
13	("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Catheter-Related Infections" OR "urinary tract infections" OR "catheter-associated urinary tract infection" OR "CAUTI" or "UTI" or "urinary tract infection") Limiters - Published Date: 2005-2015; Exclude MEDLINE records	(2)
14	("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("physical restraint" OR "restrain*") Limiters - Published Date: 2005-2015; Exclude MEDLINE records	(4)
15	("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Activities of Daily Living" OR "ADL" OR "mobility" OR "independence") Limiters - Published Date: 2005-2015; Exclude MEDLINE records	(28)

16	<p>("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Body Weight" OR "Body Mass Index" OR "Nutritional Status" OR "Eating" OR "Meals" OR "Nutrition Disorder" OR "unintentional weight loss" OR "liberalized diet" OR "nutrition" OR "food" OR "bmi" OR "malnutrition" OR "dehydration" OR "caloric" OR "calories" OR "meal" OR "feed" OR "supplement")</p> <p>Limiters - Published Date: 2005-2015; Exclude MEDLINE records</p>	(10)
17	<p>("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Depression" OR "Depressive mood")</p> <p>Limiters - Published Date: 2005-2015; Exclude MEDLINE records</p>	(19)
18	<p>("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Antipsychotic Agent" OR "antipsychotic medication" OR "atypical antipsychotic" OR "first generation antipsychotic" OR "second generation antipsychotic" OR "antipsychotics")</p> <p>Limiters - Published Date: 2005-2015; Exclude MEDLINE records</p>	(3)
19	<p>("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Medication Error" OR "medication reconciliation" OR "reducing error")</p> <p>Limiters - Published Date: 2005-2015; Exclude MEDLINE records</p>	(0)
20	<p>("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Infectious Disease Transmission" OR "healthcare associated infection" OR "HAI" OR "infection control")</p> <p>Limiters - Published Date: 2005-2015; Exclude MEDLINE records</p>	(4)
21	<p>("nursing home" OR "long-term care" OR "residential aged care" OR "skilled nursing facility" OR "aged care facility" OR "aged care facilities") AND ("randomized" OR "cluster-randomized" OR "RCT" OR "trial" OR "systematic review" OR "systematic literature review" OR "cochrane" OR "meta-analysis" OR "comparative effectiveness") AND ("Quality Improvement" OR "Quality Indicator" OR "public reporting" OR "patient safety" OR "resident safety")</p> <p>Limiters - Published Date: 2005-2015; Exclude MEDLINE records</p>	(14)

Cochrane search string

((“nursing home” OR “aged care” OR “elderly care” OR “long-term care” OR “long term care” OR elderly OR “older people” OR “older adults”) AND (falls OR “pressure ulcer” OR “pressure ulcers” OR “infection” OR “HAI” OR “healthcare-associated infection” OR “urinary tract infection” OR “UTI” OR “medication error” OR “adverse drug event” OR “ADE” OR polypharmacy OR “weight loss” OR dehydration OR “activities of daily living” OR “ADL” OR “fecal incontinence” OR “urinary incontinence” OR incontinence OR “depressive symptoms” OR “antipsychotic medication” OR pain OR “influenza vaccine” OR “pneumococcal vaccine” OR “physical restraint” OR “physical restraints” OR (catheter AND bladder))) AND limit to Cochrane Review =173
Conducted July 30,2015

Search strings updated from included systematic reviews

Crocker 2013 ¹

MEDLINE search strategy

We used the following search strategy for MEDLINE (Ovid) and adapted it for the other databases

1. Homes for the Aged/ or "homes for the aged".tw.
2. exp Nursing Homes/ or nursing home?.tw.
3. (aged adj2 (care or nursing or healthcare or residential) adj2 (facility or facilities or home?)).ti,ab.
4. ((geriatric or elderly) adj2 (facility or facilities or care home?)).ti,ab.
5. Hospitals, Veterans/
6. Housing for the Elderly/
7. Geriatric Nursing/
8. or/1-7 [care facilities/nursing - aged terms]
9. exp aged/
10. (gerontol* or ageing or aging or elder* or geriatric* or seniors or old age or older or late* life).ti,ab.
11. (older adj (person* or people or adult* or patient* or inpatient* or outpatient*)).ti,ab.
12. veterans/
13. veteran.ti,ab.
14. or/9-13 [elderly terms]
15. Nursing Care/
16. Rehabilitation Nursing/
17. Community Health Nursing/
18. Hospitals, Convalescent/
19. Rehabilitation Centers/
20. Institutionalization/
21. or/15-20 [institutional care terms]
22. 14 and 21 [institutional care terms and elderly terms]
23. Group Homes/
24. Assisted Living Facilities/
25. Residential Facilities/
26. Long-Term Care/
27. Halfway Houses/
28. ((group or residential) adj home?).ti,ab.
29. ((hous\$ or residential or residence? or institution\$ or facility or facilities) adj5 (elder* or geriatric* or seniors or older or aged)).ti,ab.
30. ((residential or long-term or longterm) adj5 (care or facility or facilities)).ti,ab.
31. ((sheltered or retirement or residential or halfway or half-way) adj5 (hous\$ or home? or accommodation)).ti,ab.
32. (life care cent\$ or continuing care cent\$ or extended care facility or extended care facilities).ti,ab.
33. ((care or convalescent) adj (home? or cent\$ or facility or facilities)).ti,ab. and 14
34. ((skilled or intermediate) adj2 (nursing facility or nursing facilities)).ti,ab. and 14
35. (healthcare adj2 (facility or facilities)).ti,ab. and 14
36. assisted living.ti,ab.
37. or/23-35 [other residential care terms]
38. 8 or 22 or 37 [care facilities/nursing -aged or institutional care terms and elder or other residential care terms]

39. rehabilitation/ or “activities of daily living”/
40. dance therapy/ or early ambulation/ or exercise therapy/ or muscle stretching exercises/ or resistance training/ or occupational therapy/
41. physical therapy modalities/ or hydrotherapy/ or musculoskeletal manipulations/
42. “Physical Therapy (Specialty)”/
43. Exercise Movement Techniques/
44. Exercise/
45. Tai Ji/
46. aqua.mp.
47. walking/ or yoga/
48. “Physical Education and Training”/
49. Physical Fitness/
50. “Recovery of Function”/
51. Residential Treatment/
52. Physical Stimulation/
53. Health Promotion/
54. leisure activities/ or recreation/ or dancing/
55. Health Facility Environment/
56. (rehabilitat\$ or exercise\$ or physiotherap\$ or keep fit).tw.
57. (physical adj3 (therap\$ or education or train\$ or stimulat\$ or fitness or activit\$ or function)).tw.
58. ((exercise or movement or occupational or residential) adj5 (therap\$ or train\$ or treatment or program\$)).tw.
59. ((strength\$ or aerobic or resistance) adj3 activit\$).tw.
60. (improve\$ adj3 (function or mobil\$ or recover\$)).tw.
61. ((fitness or health) adj3 promotion).tw.
62. (danc\$ or walk\$ or yoga or tai chi or tai ji or ji quan or taiji or taijiquan or leisure activit\$ or recreation\$ or bicycl\$ or cycl\$ or bike\$ or biking).tw.
63. ((endurance or balance or strength or flexibility or resistance) adj3 training).tw.
64. or/39-63 [rehabilitation terms]
65. randomized controlled trials as topic/
66. random allocation/
67. controlled clinical trials as topic/
68. control groups/
69. clinical trials as topic/ or clinical trials, phase i as topic/ or clinical trials, phase ii as topic/ or clinical trials, phase iii as topic/ or clinical trials, phase iv as topic/
70. clinical trials data monitoring committees/
71. double-blind method/
72. single-blind method/
73. placebos/
74. placebo effect/
75. cross-over studies/
76. multicenter studies as topic/
77. therapies, investigational/
78. drug evaluation/
79. research design/
80. program evaluation/
81. evaluation studies as topic/

82. randomized controlled trial.pt.
83. controlled clinical trial.pt.
84. (clinical trial or clinical trial phase i or clinical trial phase ii or clinical trial phase iii or clinical trial phase iv).pt.
85. multicenter study.pt.
86. (evaluation studies or comparative study).pt.
87. meta analysis.pt.
88. meta-analysis as topic/
89. random\$.tw.
90. (controlled adj5 (trial\$ or stud\$)).tw.
91. (clinical\$ adj5 trial\$).tw.
92. ((control or treatment or experiment\$ or intervention) adj5 (group\$ or subject\$ or patient\$)).tw.
93. (surgical adj5 (group\$ or subject\$ or patient\$)).tw.
94. (quasi-random\$ or quasi random\$ or pseudo-random\$ or pseudo random\$).tw.
95. ((multicenter or multicentre or therapeutic) adj5 (trial\$ or stud\$)).tw.
96. ((control or experiment\$ or conservative) adj5 (treatment or therapy or procedure or manage\$)).tw.
97. ((singl\$ or doubl\$ or tripl\$ or trebl\$) adj5 (blind\$ or mask\$)).tw.
98. (coin adj5 (flip or flipped or toss\$)).tw.
99. latin square.tw.
100. versus.tw.
101. (cross-over or cross over or crossover).tw.
102. placebo\$.tw.
103. sham.tw.
104. (assign\$ or alternate or allocat\$ or counterbalance\$ or multiple baseline).tw.
105. controls.tw.
106. (treatment\$ adj6 order).tw.
107. (meta-analy\$ or metaanaly\$ or meta analy\$ or systematic review or systematic overview).tw.
108. or/65-107
109. exp animals/ not humans.sh.
110. 108 not 109 [RCT Filter - Cochrane Stroke Group]
111. 38 and 64 and 110 [care facilities/nursing -aged or institutional care terms and elder or other residential care and rehabilitation terms and RCT]

Thompson-Coon 2014 ²

Master Search Strategy Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R)

- 1 assisted living facilities/or group homes/or homes for the aged/or nursing homes/or skilled nursing facilities/(35398)
- 2 (care adj (setting* or home* or residence* or facilit* or unit*)) .ti,ab. (103097)
- 3 long-term care.ti,ab. (12891)
- 4 LTCF.ti,ab. (227)
- 5 elderly care.ti,ab. (636)
- 6 geriatric care.ti,ab. (1130)
- 7 geriatric clinic*.ti,ab. (339)
- 8 geriatric adj2 unit).ti,ab. (722)
- 9 communal care.ti,ab. (11)

10 institutional* care.ti,ab. (1440)
 11 (residential adj (care or unit* or home*)).ti,ab. (2424)
 12 nursing home*.ti,ab. (20297)
 13 (dementia adj (unit* or home* or care)).ti,ab. (941)
 14 or/1e13 (150033)
 15 exp Dementia/(109677)
 16 exp Alzheimer Disease/(60964)
 17 dementia.ti,ab. (58425)
 18 alzheimer*.ti,ab. (80216)
 19 (cognitive adj (impairment or decline)).ti,ab. (28848)
 20 BPSD.ti,ab. (401)
 21 (agitated or agitation).ti,ab. (11407)
 22 (depressed or depression).ti,ab. (242245)
 23 (anxiety or anxious).ti,ab. (100546)
 24 (aggressive* adj2 behav*).ti,ab. (11959)
 25 (unsettled adj2 behav*).ti,ab. (11)
 26 (difficult adj2 behav*).ti,ab. (395)
 27 residents.ti,ab. (58407)
 28 or/15e27 (528228)
 29 antipsychotic*.ti,ab. (23427)
 30 neuroleptic*.ti,ab. (17905)
 31 exp Antipsychotic Agents/(117101)
 32 psychotropic*.ti,ab. (12422)
 33 29 or 30 or 31 or 32 (137714)
 34 14 and 28 and 33 (1025)
 35 ((reduce* or reducing or reduction) adj4 (medication or drug*)).ti,ab. (21110)
 36 inappropriate prescribing.ti,ab. (446)
 37 exp Inappropriate Prescribing/(329)
 38 suboptimal prescribing.ti,ab. (59)
 39 (inappropriate* adj3 (prescribed or prescriptions or medication or drug* or antipsychotics or neuroleptics)).ti,ab. (1307)
 40 35 or 36 or 37 or 38 or 39 (22890)
 41 40 and 14 (659)
 42 34 or 41 (1621)

Richter 2012 ³

Appendix 1. Search: August 2010 Source Search strategy Hits MEDLINE In-process and other non-indexed citations and MEDLINE 1950 to present (Ovid SP)

1. antipsychotic*.mp.
2. neuroleptic*.mp.
3. risperidone.mp.
4. olanzapine.mp.
5. haloperidol.mp.
6. prothipendyl.mp.
7. methotrimeprazine.mp.
8. clopenthixol.mp.
9. flupenthixol.mp.
10. clothiapine.mp.
11. methylperon.mp.
12. droperidol.mp.

13. pipamperone.mp.
14. benperidol.mp.
15. bromperidol.mp.
16. fluspirilene.mp.
17. pimozide.mp.
18. penfluridol.mp.
19. sulpiride.mp.
20. veralipride.mp.
21. levosulpiride.mp.
22. sultopride.mp.
23. aripiprazole.mp.
24. clozapine.mp.
25. quetiapine.mp.
26. thioridazine.mp.
27. phenothiazine.mp.
28. butyrophenone.mp.
29. Risperidone/
30. Haloperidol/
31. Methotrimeprazine/
32. Clopenthixol/
33. Flupenthixol/
34. Benperidol/
35. Fluspirilene/
36. Pimozide/
37. Penfluridol/
38. Sulpiride/
39. Clozapine/
40. Thioridazine/
41. Phenothiazines/
42. Butyrophenones/
43. Antipsychotic Agents/
44. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43
45. Geriatric Nursing/
46. Residential Facilities/
47. Nursing Homes/
48. "geriatric nursing".mp.
49. "residential facilit*".mp.
50. "nursing home*".mp.
51. "care home*".mp.
52. "geriatric care".mp.
53. 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52
54. discontinu*.mp.
55. cessation.mp.
56. reduc*.mp. 57. taper*.mp.
58. stop*.mp.
59. ceas*.mp.
60. 54 or 55 or 56 or 57 or 58 or 59
61. (discontinu* or cessation or reduc* or taper* or stop* or ceas*).mp. adj4 ((antipsychotic* or neuroleptic* or risperidone or olanzapine or haloperidol or prothipendyl or methotrimeprazine or

clopenthixol or flupenthixol or clothiapine or methylperon or droperidol or pipamperone or benperidol or bromperidol or fluspirilene or pimozide or penfluridol or sulpiride or veralipride or levosulpiride or sultopride or aripiprazole or clozapine or quetiapine or thioridazine or phenothiazine or butyrophenone).mp. or Risperidone/ or Haloperidol/ or Methotrimeprazine/ or Clopenthixol/ or Flupenthixol/ or Benperidol/ or Fluspirilene/ or Pimozide/ or Pen- fluridol/ or Sulpiride/ or Clozapine/ or Thioridazine/ or Phenothiazines/ or Butyrophenones/ or Antipsychotic Agents/)

62. 53 and 61

63. randomized controlled trial.pt.

64. controlled clinical trial.pt.

65. randomized.ab.

66. placebo.ab.

67. drug therapy.fs.

68. randomly.ab.

69. trial.ab.

70. groups.ab.

71. 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70

72. 62 and 71

73. 44 and 60 and 71

74. 73 and 53

75. 62 or 74

Vlaeyen 2015 ⁴

MEDLINE

inception to September 2013

((("accidental falls," OR "falls," OR "faller*") AND ("aged" OR "older" OR "elderly" OR "nursing homes" OR "residential facilities" OR "long-term care" OR "institutionalization" OR "residential*")) AND ("prevention and control"))

Cameron 2012 ⁵

MEDLINE (OvidSP)

1 Accidental Falls/ (12611)

2 (falls or faller\$).tw. (23057)

3 or/1-2 (29346)

4 exp Aged/ (2067157)

5 (older or senior\$ or elderly).tw. (338625)

6 or/4-5 (2194169)

7 and/3,6 (12226)

8 exp Residential Facilities/ (39760)

9 Long-Term Care/ (20056)

10 Institutionalization/ or Hospitalization/ (66717)

11 Subacute Care/ (705)

12 exp Hospitals/ (182789)

13 Hospital Units/ (8130)

14 Rehabilitation Centers/ (6112)

15 ((long stay or acute or sub-acute or subacute or residential or hospital) adj3 (care or ward\$1)).tw. (42017)

16 ((rehabilitation or geriatric) adj (ward\$1 or hospital\$1 or unit\$1)).tw. (4826)

17 (hostel\$1 or nursing home\$).tw. (19323)

18 or/8-17 (336948)
19 and/7,18 (2095)
20 randomized controlled trial.pt. (321532)

Anderson 2011 ⁶

MEDLINE (Ovid) 1950 to 21st December 2010

1. Beds/
2. (bed\$1 or bedside\$1 or bed?side\$1).tw.
3. ((side\$1 or safety or security) adj3 rail\$1).tw.
4. (bedrail\$1 or bed?rail\$1 or siderail\$1 or side?rail\$1 or cotside\$1 or cot?side\$1).tw.
5. (floormat* or floor?mat\$1 or ((floor) adj3 mat\$1)).tw.
6. (exit\$ adj3 (alarm\$1 or sensor\$1)).tw.
7. (ultra-low or ((low\$) adj3 height)).tw.
8. (bed?height or bed?exit\$ or bed?alarm\$1 or bed?sensor\$1 or bed?mat\$1).tw.
9. or/1-8
10. Accidents/
11. Accidental Falls/
12. exp Accident Prevention/
13. exp "Wounds and Injuries"/
14. (fall\$1 or faller\$1 or fell or injur\$ or accident\$).tw.
15. or/10-14
16. exp Hospitals/
17. exp Residential Facilities/
18. Hospitalization/
19. Institutionalization/
20. Long-Term Care/
21. ((care or nursing or residential or aged) adj3 (institution\$1 or facilit\$ or home\$1)).tw.
22. ((long?term or longterm) adj3 care).tw.
23. hospital\$1.tw.
24. or/16-23
25. and/9, 15, 24
26. Randomized Controlled Trials/
27. Random Allocation/
28. Double Blind Method/
29. Single Blind Method/
30. Cross-Over Studies/
31. randomi?ed.tw.
32. randomized controlled trial.pt.
33. controlled clinical trial.pt.
34. cluster randomi?ed trial.pt.
35. placebo.tw.
36. clinical trials as topic.sh.
37. random\$.tw.
38. or/26-37
39. (animals not (humans and animals)).sh.
40. 38 not 39

Fink 2008 ⁷

We searched the US National Library of Medicine's MEDLINE database for English-language literature published from January 1985 through May 2008, using the following key terms: (*long-term* OR *care nursing homes* OR *nursing hom\$.mp*) AND (*urinary incontinence* OR *incontinence* OR *urin\$ adj3 incont\$.tw*) AND (*clinical trial, phase III* OR *clinical trial, phase IV* OR *controlled clinical trial* OR *meta-analysis* OR *randomized controlled clinical trial* OR *meta-analysis* OR *randomized controlled trial* OR *review*). We searched the Cochrane Library's Cochrane Central Register of Controlled Trials database for English-language literature published from January 1985 through May 2008, using the following terms[(*urinary* AND *incontinence*) OR (*urin** AND *incont**)] AND [(*long-term care* OR *nursing home*) OR (*nurs** AND *hom**)]. The Cochrane search also captured Elsevier Publishing's EMBASE database because the UK Cochrane Centre annually searches EMBASE for randomized controlled trials and adds them to the Cochrane Library. The most recent EMBASE search was completed through 2006. In addition, we examined the proceedings of the 3rd International Consultation on Incontinence and the reference lists of retrieved clinical trials and review articles for information on further trials.

Hughes 2013 ⁸

Ovid MEDLINE search strategy

- 1 exp Staphylococcal Infections/ (24387)
- 2 exp Staphylococcus aureus/ (31753)
- 3 staphylococcus aureus.ti,ab. (39174)
- 4 (staphylococ* adj2 infect*).ti,ab. (3331)
- 5 exp Methicillin Resistance/ (8087)
- 6 ((methicillin or meticillin) adj2 resist*).ti,ab. (14701)
- 7 exp Penicillin Resistance/ (10646)
- 8 (penicillin adj2 resist*).ti,ab. (3403)
- 9 exp Methicillin-Resistant Staphylococcus aureus/ (5770)
- 10 (mrsa or emrsa).ti,ab. (10693)
- 11 or/1-10 (57995)
- 12 exp Homes for the Aged/ (5791)
- 13 exp Nursing Homes/ (16338)
- 14 exp Group Homes/ (591)
- 15 or/13-14 (16876)
- 16 exp Aged/ (1329545)
- 17 (aged or old people or older people or old persons or older persons or old resident* or older resident* or elders or elderly or elderly people or elderly persons or elderly residents or geriatric or old resident* or older resident* or elderly resident*).ti,ab. (326747)
- 18 or/16-17 (1489058)
- 19 15 and 18 (11344)
- 20 (group adj2 home*).ti,ab. (1081)
- 21 (extended care adj2 facilit*).ti,ab. (150)
- 22 (long-term care adj2 facilit*).ti,ab. (2516)
- 23 (care adj2 (home* or facilit*)).ti,ab. (21437)
- 24 (rest adj2 home*).ti,ab. (118)
- 25 (residential adj2 (home* or care)).ti,ab. (2155)
- 26 (geriatric adj2 (home* or unit* or facilit* or institution*)).ti,ab. (928)
- 27 (nursing adj2 (home*1 or unit*1 or center*1 or centre*1)).ti,ab. (14371)

28 or/20-27 (35889)
29 18 and 28 (19456)
30 12 or 19 or 29 (24090)
31 11 and 30 (342)

Thomas 2010⁹

MEDLINE (OVID)
1 exp INFLUENZA/
2 influenza.mp.
3 or/1-2
4 exp VACCINES/
5 exp VACCINATION/
6 (immuniz\$ or immunis\$).mp.
7 vaccin\$.mp.
8 or/4-7
9 3 and 8
10 exp Influenza Vaccine/
11 (influenz\$ adj (vaccin\$ or immun\$)).mp.
12 or/10-11
13 9 or 12
14 exp Health Personnel/
15 (health personnel or healthcare personnel or health care personnel).mp.
16 (health worker\$ or healthcare worker\$ or health care worker\$).mp.
17 (healthcare provider\$ or health care provider\$).mp.
18 (health practitioner\$ or healthcare practitioner\$ or health care practitioner\$).mp.
19 health employee\$.mp.
20 medical staff.mp.
21 (doctor\$ or physician\$).mp.
22 (allied health adj (staff or personnel)).mp.
23 paramedic\$.mp.
24 nursing staff.mp.
25 nurse\$.mp.
26 nursing auxiliar\$.mp.
27 hospital personnel.mp.
28 hospital staff.mp.
29 hospital worker\$.mp.
30 exp HOSPITALS/
31 exp Long-Term Care/
32 exp Residential Facilities/
33 nursing home\$.mp.
34 (institution\$ adj3 elderly).mp.
35 or/14-34
36 13 and 35

Fleming 2013¹⁰

Appendix 1: Search Strategy:
Database searched: Pubmed
1. Long term care facilit\$/
2. Nursing home/

3. Residential care facilit\$/
4. Veterans hospitals/
5. Healthcare facilit\$/
6. Assisted living facilit\$/
7. Or/1-6
8. Antibiotic/
9. Antimicrobial/
10. Antiinfective agent/
11. Antibiotic therapy/
12. Antibiotic prophylaxis/
13. Or/8-12
14. Urinary tract infection/
15. Bacteriuria/
16. Respiratory tract infection/
17. Skin and soft tissue infection/
18. Or/14-17
19. 7 and 13 and 18 and randomised controlled trial
20. 7 and 13 and 18 and intervention study

Chhabra 2012 ¹¹

Search strategy

1. exp "Continuity of Patient Care"/
2. care transition.mp.
3. 1 or 2
4. drug*.mp.
5. medication.mp.
6. 4 or 5
7. 3 and 6
8. exp "Drug Utilization Review"/
9. exp Medication Therapy Management/
10. exp Medical History Taking/
11. 3 and 10
12. admission.mp.
13. discharge.mp.
14. transfer.mp.
15. readmission.mp.
16. 12 or 13 or 14 or 15
17. 6 and 16
18. medication reconciliation.mp.
19. "drug utilization review".mp. [mp¼title, original title, abstract, name of substance word, subject heading word, unique identifier]
20. "medication therapy management".mp. [mp¼ title, original title, abstract, name of substance word, subject heading word, unique identifier]
21. 8 or 19
22. 9 or 20
23. 3 and 21
24. 3 and 22
25. 7 or 11 or 17 or 18 or 23 or 24
26. exp Residential Facilities/
27. "long term care".mp. or exp Long-Term Care/

28. "assisted living".mp.
29. "assisted living".mp. or Assisted Living Facilities/
30. "group home".mp.
31. "home* for the aged".mp.
32. "intermediate care".mp.
33. "skilled nursing facility".mp. or Skilled Nursing Facilities/
34. "skilled nursing facilities".mp. or Skilled Nursing Facilities/
35. exp Hospices/or exp Hospice Care/or "hospice*".mp.
36. "home nursing".mp. or exp Home Nursing/
37. "home health".mp.
38. exp Home Health Aides/
39. 37 or 38
40. "continuing care retirement".mp. or exp Housing for the Elderly/
41. Home Care Services/or exp Home Care Agencies/
42. 40 or 41
43. 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 35 or 36 or 39 or 42
44. 25 and 43
45. "SNF".mp.
46. 43 or 45
47. 25 and 46
48. nursing home.mp.
49. continuing care.mp.
50. exp Patient Admission/
51. exp Patient Discharge/
52. exp Patient Transfer/
53. exp Patient Readmission/
54. 16 or 50 or 51 or 52 or 53
55. 6 and 54
56. exp Housing for the Elderly/
57. 26 or 27 or 28 or 30 or 31 or 32 or 33 or 35 or 36 or 37 or 38 or 41 or 45 or 48 or 49 or 56
58. 7 or 11 or 23 or 24 or 55
59. 57 and 58

Forsetlund 2011 ¹²

Database: Ovid MEDLINE(R)

1. exp nursing homes/ or intermediate care facilities/ or skilled nursing facilities/
2. nursing home\$.tw.
3. homes for the aged/
4. or/1-3
5. residential facilities/
6. Long-Term Care/
7. intermediate care.tw.
8. (extended care adj4 facilit\$).tw.
9. skilled nursing facilit\$.tw.
10. (long term care or long term facilit\$).tw.
11. or/5-10
12. exp aged/ or exp "aged, 80 and over"/ or exp frail elderly/
13. (elderly or old or older or aged or geriatr\$).tw.
14. 12 or 13
15. 11 and 14

16. 4 or 15 17. drug utilization/ or "drug utilization review"/
18. Drug Toxicity/
19. drug therapy/ or drug prescriptions/ or medication errors/
20. Drug Interactions/
21. exp Central Nervous System Agents/
22. exp therapeutic uses/
23. ((inappropriate or suboptimal) adj4 prescri\$).tw.
24. (multiple adj4 medication).tw.
25. (unnecessary adj4 drug\$).tw.
26. drug therapy.tw.
27. (reduc\$ adj6 (drug or drugs)).tw.
28. (drug\$ adj3 "use").tw.
29. (drug\$ adj6 prescri\$).tw.
30. (drug\$ adj4 monitor\$).tw.
31. (drug\$ adj4 screen\$).tw.
32. polypharmacy/
33. polypharmacy.tw.
34. (medication adj4 appropriateness).tw.
35. (prescribing adj4 quality).tw.
36. (pharmaceutical\$ or pharmacological).tw.
37. (drug\$ adj4 withdrawal).tw.
38. (sedative\$ or tranquilizers or sedation).tw.
39. drug therapy.fs. Table S1 4
40. exp Pharmaceutical Preparations/
41. exp Pharmaceutical Preparations/
42. or/17-41
43. 16 and 42
44. limit 43 to "reviews (specificity)"
45. randomized controlled trial.pt.
46. controlled clinical trial.pt.
47. randomized.ab.
48. placebo.ab.
49. randomly.ab.
50. trial.ab.
51. groups.ab.
52. 45 or 46 or 47 or 48 or 49 or 50 or 51
53. humans.sh.
54. 52 and 53
55. 54 and 43
56. (2005\$ or 2006\$ or 2007\$ or 2008\$ or 2009\$).ed,ep,yr,dp.
57. 55 and 56 58. 44 or 57

Brownie 2013 ¹³

Medline

Patient-centered care [MeSH] OR "person-cent#red care" OR "patient-focus#ed care" OR "residentcent#red care" OR "relationship-cent#red care" OR "individuali#ed care" OR "resident-oriented care" 61

AND

Homes for the aged [MesH] OR nursing homes [MesH] OR residential facilities [MesH] OR long-term care [MesH] OR assisted living facilities [MesH]

OR

“Eden Alternative” OR “Green House model” OR “Wellspring model”

Limiters 1995–2012; full text, English

Hodgkinson 2011 ¹⁴

MEDLINE Search Strategy Database: Ovid MEDLINE(R)

- 1 “Personnel Staffing and Scheduling”/ (10253)
- 2 (personnel schedul\$ or personnel staffing).tw. (54)
- 3 Nursing Staff/ (12671)
- 4 nurse patient ratio\$.tw. (68)
- 5 ((nurs\$ or rn) adj (mix or ratio?)).tw. (86)
- 6 Health Manpower/ (8712)
- 7 exp Patient Care Team/ (39416)
- 8 ((nursing or patient care) adj team?).tw. (716)
- 9 (personal adj2 attendant\$).tw. (23)
- 10 community health aides/ or home health aides/ or nurses' aides/ (5290)
- 11 ((community or health or home or nurs\$) adj aide\$).tw. (1015)
- 12 (staff\$ adj model\$).tw. (411)
- 13 or/1-12 (75047)
- 14 exp Nursing Homes/ (25049)
- 15 (nursing adj home\$).tw. (14968)
- 16 (residential adj (aged or elderly or geriatric)).tw. (91)
- 17 Long-Term Care/ (17145)
- 18 ((long term or extended) adj care).tw. (9762)
- 19 17 or 18 (22133)
- 20 exp Aged/ (1638076)
- 21 19 and 20 (10212)
- 22 14 or 15 or 16 or 21 (36448)
- 23 13 and 22 (3195)
- 24 randomized controlled trial.pt. (240688)
- 25 controlled clinical trial.pt. (75766)
- 26 intervention studies/ (3539)
- 27 experiment\$.tw. (882864)
- 28 (time adj series).tw. (6579)
- 29 (pre test or pretest or posttest or post test).tw. (7906)
- 30 random allocation/ (58787)
- 31 impact.tw. (207947)
- 32 intervention?.tw. (249884)
- 33 chang\$.tw. (1406095)
- 34 evaluation studies/ (117851)
- 35 evaluat\$.tw. (1238074)
- 36 effect?.tw. (2493606)
- 37 comparative study.pt. (1358984)
- 38 or/24-37 (5724011)
- 39 animal/ (4183149)
- 40 human/ (9917377)
- 41 39 not (39 and 40) (3170506)
- 42 38 not 41 (4013283)
- 43 23 and 42 (940)

Mohler 2011 ¹⁵

Medline (Ovid SP)

1. physical restraint*.mp.
2. (bedrail* or "bed rail*").mp.
3. (bedchair* or "bed chair*").mp.
4. "containment measure*".mp.
5. exp Restraint, Physical/
6. Education, Nursing/
7. 6 or 4 or 1 or 3 or 2 or 5
8. elderly.mp.
9. ("old people" or "old person*").mp.
10. geriatric*.mp.
11. aged.mp.
12. ("nursing home*" or nursinghome).mp.
13. "care home*".mp.
14. ("residential home*" or "residential facilit*").mp.
15. Aged/
16. Residential Facilities/
17. 11 or 9 or 12 or 15 or 14 or 8 or 16 or 10 or 13
18. 7 and 17
19. randomized controlled trial.pt.
20. controlled clinical trial.pt.
21. randomi?ed.ab.
22. randomly.ab.
23. trial.ab.
24. groups.ab.
25. 22 or 21 or 24 or 23 or 19 or 20
26. (animals not (humans and animals)).sh.
27. 25 not 26
28. 27 and 18
29. (200809* or 200810* or 200811* or 200812*).ed.
30. 2009*.ed.
31. 30 or 29
32. 28 and 31

Gillespie 2014 ¹⁶

Ovid MEDLINE

- 1 exp Pressure Ulcer/ (5231)
- 2 (pressure adj (ulcer* or sore*)).tw. (4365)
- 3 (decubitus adj (ulcer* or sore*)).tw. (579)
- 4 (bedsore* or (bed adj sore*)).tw. (245)
- 5 or/1-4 (6546) 6 exp Posture/ (27564)
- 7 (reposition* or re-position*).tw. (6619)
- 8 position*.tw. (235791)
- 9 (turn* adj5 patient*).tw. (3591)
- 10 (turn* adj5 interval*).tw. (126)
- 11 (turn* adj5 frequen*).tw. (777)
- 12 turning.tw. (7625)
- 13 (body adj5 posture*).tw. (1092)

14 pressure relie*.tw. (417)
 15 (mobilis* or mobiliz*).tw. (34978)
 16 or/6-15 (301537)
 17 5 and 16 (834)
 18 randomized controlled trial.pt. (240548)
 19 controlled clinical trial.pt. (39492)
 20 randomized.ab. (195665)
 21 placebo.ab. (91366)
 22 clinical trials as topic.sh. (79465)
 23 randomly.ab. (134439)
 24 trial.ti. (72586)
 25 or/18-24 (543387)
 26 (animals not (humans and animals)).sh. (1612439)
 27 25 not 26 (494803)
 28 17 and 27 (107)

Sullivan 2013¹⁷

1 Disease/Condition *pressure ulcer/ or pressure ulcer*.ti,ab. or ((skin ulcers/ or skin ulcer/) and pressure.ti,ab.)
 2 (exp decubitus/ or exp decubitus ulcer/) and skin.mp.
 3 (pressure adj2 (sore\$ or ulcer\$ or wound\$)).ti,ab.
 4 (bedsore\$ or (bed adj2 sore\$)).ti,ab.
 5 (decubitus adj ulcer\$).ti,ab.
 6 Combine sets for Disease 1 or 2 or 3 or 4 or 5
 7 Intervention/Program Implementation/Quality improvement program evaluation/ or program development/ or safety management/methods or models, organizational/ or clinical effectiveness/evaluation or quality assurance, health care/ or ((clinical or medical) adj (protocol* or checklist* or documentation*)).ti,ab.
 8 (quality and improv\$ and intervention\$).mp.
 9 (implement* or initiative* or program* or intervention or train* or checklist* or standard* or protocol).mp.
 10 exp health care quality/ or (quality of health care or quality assurance,health care or quality indicators, health care or health plan implementation).sh.
 11 Combine sets for Intervention/Program Implementation/Quality improvement 7 or 8 or 9 or 10
 Downloaded From: <http://annals.org/> by a Vanderbilt University User on 08/05/2015 Set Number
 Concept Search Statement
 12 Obstacles/Barriers attitude of health personnel/ or education, medical/ or staff, hospital/education or clinical competence/ or health knowledge, attitudes, practice/ or physician practice patterns/
 13 (imped\$ or obstacle\$ or barrier\$ or outcome\$ or compliance\$ or ((nurse\$ or physician\$ or staff or employee) and (educat\$ or train\$ or knowledge or attitude\$ or competen\$ or time))).mp.
 14 Combine sets for Obstacles 12 or 13
 15 Context/Setting (hospital\$ or hospital-acquired or inpatient\$ or patient\$ or acute care or long term care or long-term care).ti,ab.
 16 exp health care organization/ or exp health planning organizations/ or ((hospital\$ or health system\$ or health care or healthcare or medical) and (collaborat\$ or alliance\$ or coalition\$ or network\$)).mp.
 17 Combine sets for Setting 15 or 16
 18 Combine Disease/Condition and Intervention/Program Implementation/Quality improvement 6 and 11

19 Combine Disease and Intervention/Program Implementation/Quality improvement 14 and 18
 20 Combine Obstacles and Disease and Intervention/Program Implementation/Quality improvement and Setting 19 and 17
 21 Remove duplicates Remove duplicates from 20
 22 Limit by date Limit 21 to yr="2000-2012"
 23 Incidence or prevalence exp incidence/ or exp prevalence/ or (incidence or prevalence or rate or increase or decrease or number).mp.
 24 exp Demography/sn [Statistics & Numerical Data]
 25 Combine for Incidence or prevalence 23 or 24
 26 Combine Obstacles and Disease and Intervention/Program Implementation/Quality improvement and Setting and Incidence 22 and 25
 27 Limit Limit 26 to English language
 28 Limit Limit 27 to human
 29 Combine Disease and Quality Improvement 6 and 8
 30 Combine for final set 22 or 28 or 29
 31 Limit Limit 30 to yr="2000-2012"
 32 Limit Limit 31 to English language
 33 Limit Limit 32 to human

___ 2009 ¹⁸ Pressure ulcer

Database: Ovid MEDLINE(R)

1 exp Beds/ (1214)
 2 (bed or beds or bedding).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (31944)
 3 (mattress\$ or cushion\$ or foam\$ or transfoam\$ or overlay\$ or pad or pads or gel).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (123324)
 4 (pressure adj1 (relie\$ or reduc\$ or device\$)).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (2660)
 5 (positioning or reposition\$).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (15147)
 6 (elevation adj1 device\$).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (1)
 7 ((low adj pressure) and (support\$ or device\$)).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (842)
 8 (constant adj1 pressure).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (671)
 9 (alternat\$ adj1 pressure).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (75)
 10 ((air or water) adj1 suspension).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (67)
 11 (static adj1 air).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (25)
 12 (therarest or clinifloat or vaperm or maxifloat or hammock\$).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (100)
 13 (foot adj1 waffle).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (3)
 14 (silicore or pegasus).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (48)
 15 (cairwave adj1 therapy).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (4)

16 (turning adj1 table\$).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (1)
 17 (kinetic adj1 (table\$ or therap\$)).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (42)
 18 (air adj bag).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (156)
 19 or/1-18 (172565) Pressure Ulcer Prevention – Ontario Health Technology Assessment Series 2009;9(TBA) 90
 20 exp Pressure Ulcer/ (3354)
 21 ((decubitus or bed or pressure) adj1 (ulcer\$ or sore\$)).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (4099)
 22 20 or 21 (4099)
 23 19 and 22 (1118)
 24 limit 23 to (humans and english language and yr="2004 - 2007") (293)
 25 limit 24 to (controlled clinical trial or meta analysis or randomized controlled trial) (35)
 26 (meta analy\$ or metaanaly\$ or pooled analysis or (systematic\$ adj2 review\$)).mp. or (published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ab. (55568)
 27 exp Random Allocation/ or random\$.mp. [mp=title, original title, abstract, name of substance word, subject heading word] (329544)
 28 exp Double-Blind Method/ (48416)
 29 exp Control Groups/ (498)
 30 exp Placebos/ (8441)
 31 RCT.mp. (2048)
 32 or/25-31 (371081)
 33 24 and 32 (61)

Abbott 2013 ¹⁹

1 meal*.ti,ab. (46624)
 2 (undernutrition or under nutrition).ti,ab. (4723)
 3 nutrition education.ti,ab. (2717)
 4 malnutrition.ti,ab. (24383)
 5 food.ti,ab. (24383)
 6 eating.ti,ab. (216612)
 7 dining.ti,ab. (584)
 8 feeding.ti,ab. (122004)
 9 breakfast*.ti,ab. (5784)
 10 dinner*.ti,ab. (2112)
 11 lunch*.ti,ab. (3916)
 12 (tea or teatime).ti,ab. (16948)
 13 snack*.ti,ab. (3517)
 14 home environment.ti,ab. (2348)
 15 (ambience or ambiance).ti,ab. (285)
 16 (diet or dietary).ti,ab. (280159)
 17 or/1-16 (619034)
 18 Aged/ (2107620)
 19 geriatric*.ti,ab. (29134)

- 20 elderly.ti,ab. (152901)
- 21 (old* adj (people or resident*)).ti,ab. (15432)
- 22 old* adults.ti,ab. (27517)
- 23 old* men.ti,ab. (7393)
- 24 old* male*.ti,ab. (46226)
- 25 old* women.ti,ab. (11570)
- 26 old* female.ti,ab. (36547)
- 27 later life.ti,ab. (5215)
- 28 (long stay adj2 patients).ti,ab. (590)
- 29 older patients.ti,ab. (20393)
- 30 old age patients.ti,ab.(54)
- 31 resident*.ti,ab. (98872)
- 32 or/18-31 (2308005)
- 33 care setting*.ti,ab. (18665)
- 34 care home*.ti,ab. (1533)
- 35 care residence.ti,ab. (15)
- 36 care unit*.ti,ab. (70277)
- 37 long term care.ti,ab. (12652)
- 38 elderly care.ti,ab. (618)
- 39 geriatric care.ti,ab. (1109)
- 40 communal care.ti,ab. (11)
- 41 institutional* care.ti,ab. (1408)
- 42 (residential adj (care or unit* or home*)).ti,ab. (2375)
- 43 nursing home*.ti,ab. (19995)
- 44 or/33-43 (121749)
- 45 17 and 32 and 44 (2498)

Bunn 2015 ²⁰

Database: Ovid MEDLINE(R)

- 1 Dehydration/ (9762)
- 2 Hypovolemia/ (957)
- 3 Drinking/ (11845)
- 4 Drinking Water/ (551)
- 5 beverage/ (9073)
- 6 drinking behavior/ (5676)
- 7 fluid therapy/ (13205)
- 8 Hypernatremia/ (1958)
- 9 (hydrate or hydration or hydrating or hydrated).tw. (29529)
- 10 (dehydrate or dehydration or dehydrating or dehydrated).tw. (22101)
- 11 (de adj (hydrate or hydration or hydrating or hydrated)).tw. (12)
- 12 (rehydrate or rehydration or rehydrating or rehydrated).tw. (6055)
- 13 (re adj (hydrate or hydration or hydrating or hydrated)).tw. (79)
- 14 euhydrat*.tw. (376)
- 15 (eu adj hydrat*).tw. (0)
- 16 hypohydrat*.tw. (274)

17 (hypo adj hydrat*).tw. (2)
 18 hypovol?em*.tw. (6597)
 19 (hypo adj vol?em*).tw. (8)
 20 ((fluid* or water*) adj5 (volum* or intake* or balance* or imbalance* or measur* or monitor* or replac* or replenish*)).tw. (64093)
 21 (fluid* adj5 (therapy or therapies)).tw. (3685)
 22 "fluid deficit".tw. (122)
 23 hypernatr?em*.tw. (2031)
 24 (hyper adj natr?em*).tw. (2)
 25 ((fluid* or liquid* or water*) adj3 manag*).tw. (4029)
 26 drink*.tw. (81175)
 27 Beverage*.tw. (11566)
 28 (liquid* adj5 (volum* or intake* or measur* or monitor* or replac* or replenish*)).tw. (11340)
 29 or/1-28 (241979)
 30 exp Aged/ (2136445)
 31 exp Dementia/ (108267)
 32 geriatrics/ (25768)
 33 aged.tw. (302670)
 34 ag?ing.tw. (112784)
 35 ((old or older) adj (resident* or age* or adult* or person* or people or wom?n or female* or m?n or male* or patient*)).tw. (356398)
 36 alzheimer*.tw. (74385)
 37 dement*.tw. (58462)
 38 elder*.tw. (153935)
 39 geriatr*.tw. (28216)
 40 (senior adj citizen*).tw. (1015)
 41 or/30-40 (2697112)
 42 exp Hospitals/ (187119)
 43 exp housing for the elderly/ (1378)
 44 exp health services for the aged/ (14107)
 45 exp residential facilities/ (40602)
 46 exp long term care/ (20484)
 47 Geriatric nursing/ (11762)
 48 (assist* adj living adj (facility or facilities)).tw. (389)
 49 (resident* adj5 (care or caring or facility or facilities or home* or hous* or institution* or living)).tw. (17483)
 50 ((care or caring) adj5 (facility or facilities or home* or hous* or institution* or living* or nurs*)).tw. (92371)
 51 (nursing adj home*).tw. (19400)
 52 (longterm adj5 (care or caring)).tw. (102)
 53 (long adj term adj5 (care or caring)).tw. (15786)
 54 (longterm adj5 (home* or hous*)).tw. (17)
 55 (long adj term adj5 (home* or hous*)).tw. (2409)
 56 (community adj dwelling*).tw. (8908)
 57 or/42-56 (356214)
 58 29 and 41 and 57 (1316)
 59 (animals not (humans and animals)).sh. (3678890)
 60 58 not 59 (1315)
 61 Randomized controlled trials as topic/ (82478)
 62 randomized controlled trial/ (334518)
 63 random allocation/ (75491)

64 double blind method/ (116539)
 65 single blind method/ (16574)
 66 clinical trial/ (472615)
 67 clinical trial, phase i.pt. (12472)
 68 clinical trial, phase ii.pt. (19900)
 69 clinical trial, phase iii.pt. (7260)
 70 clinical trial, phase iv.pt. (735)
 71 controlled clinical trial.pt. (84887)
 72 randomized controlled trial.pt. (334518)
 73 multicentre study.pt. (0)
 74 clinical trial.pt. (472615)
 75 exp clinical trials as topic/ (259720)
 76 or/61-75 (856336)
 77 (clinical adj trial*).tw. (173533)
 78 ((singl* or doubl* or trebl* or tripl*) adj (blind\$3 or mask\$3)).tw. (114166)
 79 placebos/ (31226)
 80 placebo\$.tw. (138395)
 81 randomly allocated.tw. (13907)
 82 (allocated adj2 random\$).tw. (16236)
 83 or/77-82 (355283)
 84 76 or 83 (963659)
 85 case report.tw. (168396)
 86 letter/ (757175)
 87 historical article/ (285656)
 88 or/85-87 (1200732)
 89 84 not 88 (936734)
 90 epidemiologic studies/ (5473)
 91 exp case control studies/ (568507)
 92 exp cohort studies/ (1201978)
 93 case control.tw. (62035)
 94 (cohort adj (study or studies)).tw. (62980)
 95 cohort analy\$.tw. (2801)
 96 (follow up adj (study or studies)).tw. (33310)
 97 (observational adj (study or studies)).tw. (31705)
 98 longitudinal.tw. (111946)
 99 retrospective.tw. (217012)
 100 cross sectional.tw. (126381)
 101 cross-sectional studies/ (145483)
 102 or/90-101 (1609864)
 103 exp intervention studies/ (5473)
 104 Comparative Study/ (1598341)
 105 exp control groups/ (1360)
 106 trial*.tw. (509732)
 107 (((nonequivalent or non equivalent) adj3 control*) or posttest* or post test* or pretest* or pre test* or quasi experiment* or quasiexperiment* or time series or timeseries).tw. (31465)
 108 epidemiologic research design/ or control groups/ or cross-over studies/ (33374)
 109 "cross over study".tw. (5331)
 110 "crossover study".tw. (11891)
 111 "cross over studies".tw. (287)
 112 "crossover studies".tw. (686)
 113 ((comparative or cluster) adj (study or studies)).tw. (65680)

114 (experiment* adj (study or studies)).tw. (62601)
 115 (prospective adj (study or studies)).tw. (99923)
 116 rct*.tw. (11773)
 117 89 or 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 or 111 or 112 or 113 or
 114 or 115 or 116 (3743653)
 118 60 and 117 (673)
 119 alcohol*.ti. (91532)
 120 118 not 119 (576)

References

1. Crocker T, Forster A, Young J, et al. Physical rehabilitation for older people in long-term care. *Cochrane Database of Systematic Reviews* 2013(2)PMID: CD004294.
2. Thompson Coon J, Abbott R, Rogers M, et al. Interventions to reduce inappropriate prescribing of antipsychotic medications in people with dementia resident in care homes: a systematic review. *J Am Med Dir Assoc* 2014 Oct;15(10):706-18. PMID: 25112229.
3. Richter T, Meyer G, Mohler R, et al. Psychosocial interventions for reducing antipsychotic medication in care home residents. *Cochrane Database Syst Rev* 2012;12:CD008634. PMID: 23235663.
4. Vlaeyen E, Coussement J, Leysens G, et al. Characteristics and effectiveness of fall prevention programs in nursing homes: a systematic review and meta-analysis of randomized controlled trials. *J Am Geriatr Soc* 2015 Feb;63(2):211-21. PMID: 25641225.
5. Cameron ID, Gillespie LD, Robertson MC, et al. Interventions for preventing falls in older people in care facilities and hospitals. *Cochrane Database Syst Rev* 2012;12:CD005465. PMID: 23235623.
6. Anderson O, Boshier PR, Hanna GB. Interventions designed to prevent healthcare bed-related injuries in patients. *Cochrane Database Syst Rev* 2011(11):CD008931. PMID: 22071860.
7. Fink HA, Taylor BC, Tacklind JW, et al. Treatment interventions in nursing home residents with urinary incontinence: a systematic review of randomized trials. *Mayo Clin Proc* 2008 Dec;83(12):1332-43. PMID: 19046552.
8. Hughes C, Tunney M, Bradley Marie C. Infection control strategies for preventing the transmission of meticillin-resistant *Staphylococcus aureus* (MRSA) in nursing homes for older people. *Cochrane Database of Systematic Reviews* 2013(11)PMID: CD006354.
9. Thomas RE, Jefferson T, Lasserson TJ. Influenza vaccination for healthcare workers who work with the elderly. *Cochrane Database Syst Rev* 2010(2):CD005187. PMID: 20166073.
10. Fleming A, Browne J, Byrne S. The effect of interventions to reduce potentially inappropriate antibiotic prescribing in long-term care facilities: a systematic review of randomised controlled trials. *Drugs Aging* 2013 Jun;30(6):401-8. PMID: 23444263.
11. Chhabra PT, Rattinger GB, Dutcher SK, et al. Medication reconciliation during the transition to and from long-term care settings: a systematic review. *Res Social Adm Pharm* 2012 Jan-Feb;8(1):60-75. PMID: 21511543.
12. Forsetlund L, Eike MC, Gjerberg E, et al. Effect of interventions to reduce potentially inappropriate use of drugs in nursing homes: a systematic review of randomised controlled trials. *BMC Geriatr* 2011;11:16. PMID: 21496345.
13. Brownie S, Nancarrow S. Effects of person-centered care on residents and staff in aged-care facilities: a systematic review. *Clinical interventions in aging* 2013 2013/01/03;8:1-10.

14. Hodgkinson B, Haesler Emily J, Nay R, et al. Effectiveness of staffing models in residential, subacute, extended aged care settings on patient and staff outcomes. Cochrane Database of Systematic Reviews 2011(6)PMID: CD006563.
15. Mohler R, Richter T, Kopke S, et al. Interventions for preventing and reducing the use of physical restraints in long-term geriatric care. Cochrane Database Syst Rev 2011(2):CD007546. PMID: 21328295.
16. Gillespie BM, Chaboyer WP, McInnes E, et al. Repositioning for pressure ulcer prevention in adults. Cochrane Database Syst Rev 2014;4:Cd009958. PMID: 24700291.
17. Sullivan N, Schoelles KM. Preventing in-facility pressure ulcers as a patient safety strategy: a systematic review. Ann Intern Med 2013 Mar 5;158(5 Pt 2):410-6. PMID: 23460098.
18. . Pressure ulcer prevention: an evidence-based analysis. Ont Health Technol Assess Ser 2009;9(2):1-104. PMID: 23074524.
19. Jeon MY, Jeong H, Petrofsky J, et al. Effects of a randomized controlled recurrent fall prevention program on risk factors for falls in frail elderly living at home in rural communities. Med Sci Monit 2014;20:2283-91. PMID: 25394805.
20. Bunn D, Jimoh F, Wilsher SH, et al. Increasing fluid intake and reducing dehydration risk in older people living in long-term care: a systematic review. J Am Med Dir Assoc 2015 Feb;16(2):101-13. PMID: 25499399.